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# MULTIMEDIA UNIVERSITY

## FINAL EXAMINATION

TRIMESTER 1, 2018/2019

### ETM7206 – SPECIAL TOPICS ON EMERGING TECHNOLOGIES & STANDARDS

(All sections / Groups)

17 OCT 2018  
2.00 p.m. – 5.00 p.m.  
(3 Hours)

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#### INSTRUCTION TO STUDENT

1. This Question paper consists of 5 pages including cover page with 4 Questions only.
2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please print all your answers in the answer Booklet provided.

**Question 1**

- (a) Differentiate among communication, telecommunication and data communication. [6 marks]
- (b) Provide THREE(3) advantages and disadvantages of client and server computing. [6 marks]
- (c) Design a local area network (LANs) system which consists of two networks for ring and bus topologies which consists of six stations for each network. [6 marks]
- (d) An internet is the global system of interconnected computer networks around the world. Describe how the internet works which involved LAN Server and on-line service. Draw a related diagram to support your answer. [7 marks]

**Continued...**

**Question 2**

- (a) Provide FOUR (4) examples of information browsing in internet. [8 marks]
- (b) An internet system provider (ISP) is granted a block of addresses starting with 120.60.4.0/22. The ISP wants to distribute these blocks to 100 organizations with each organization receiving just eight addresses. Design the sub-blocks and give the slash notation for each sub-block. Find out how many addresses are still available after these applications. [6 marks]
- (c) Describe the Universal Software Radio Peripheral (USRP) that widely is used in 4G and 5G telecommunication projects. [5 marks]
- (d) Reference Signals Received Power (RSRP) is a measurement of the received power level in Long-Term Evolution (LTE) cell network. Figure Q2 shows the effects of RSRP with distance on LTE 800MHz and 1800MHz between mobile phone and LTE base station. Make an observation regarding the RSRP, free space loss and attenuation from the graph.

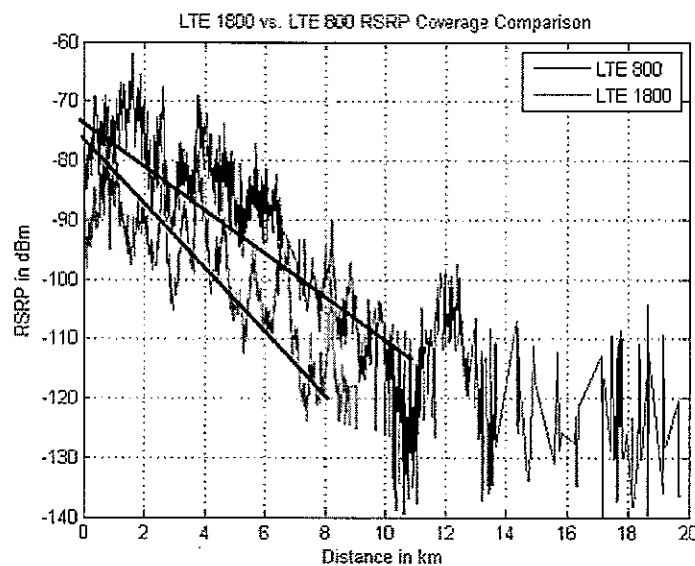


Figure Q2

[6 marks]

**Continued...**

### Question 3

- (a) In mobile evolution, mobile technologies are rolling out from 2G to 3G and High Speed Downlink Packet Access (HSDPA) to provide an access network with better speeds. Provide EIGHT (8) example of mobile technologies from low to high speeds which are equivalent with the evolution involving GSM, GPRS, EDGE, WCDMA and HSDPA.

[8 marks]

- (b) Consider the LTE system deployed in Malaysia.

- (i) Consider a mobile subscriber who is currently watching a video clip from www.youtube.com over an LTE connection. Discuss what will happen when a voice call intended to the subscriber reaches his/her device. Explain your answer.

[5 Marks]

- (ii) Discuss what has to be done in order to avoid the above situation.

[3 Marks]

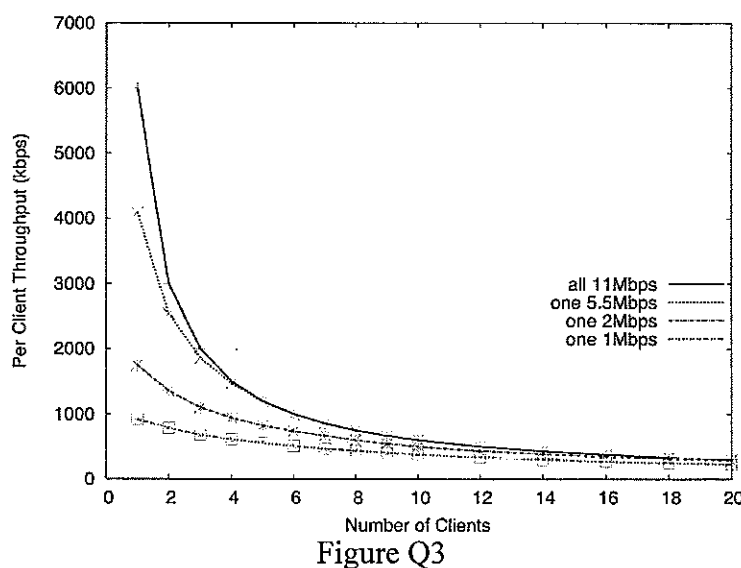
- (c) Figure Q3 shows the average (per client) throughput performance experienced by IEEE 802.11b clients within a single cell from a simulation study. In the simulation, all clients except one transmit at 11Mbps. The exceptional client transmits at 1Mbps, 2Mbps, 5.5Mbps or 11Mbps, corresponding to the four curves in Figure Q3. From the figure,

- (i) make an observation regarding the performance of multi-rate support.

[4 marks]

- (ii) discuss the causes of the performance trend observed.

[5 marks]



Continued...

### Question 4

- (a) LTE-A is the latest standard in the mobile network technology tree that previously realized the GSM/EDGE and UMTS/HSPA network technologies that now account for over 85% of all mobile subscribers. Provide the reasons in implementing a LTE-A technology in telecommunication in year 2020.

[5 marks]

- (b) Orthogonal Frequency-Division Multiplexing (OFDM) is a method of encoding digital data on multiple carrier frequencies, which deals with the assignment of multiple users to a shared communication resource. In your opinion, provide reasons why multicarrier OFDM is not suitable for uplink and not a viable solution for low power mobiles.

[8 marks]

- (c) Modulation is the process of varying one or more properties of a carrier signal, with a modulating signal that typically contains information to be transmitted. Figure Q4 shows the performance of different modulation schemes for 2 different code rate which are common code and common typical code in Long Term Evolution (LTE). From the figure, make an observation regarding the performance of different order of modulation scheme. Then, discuss the causes of the performance trend observed.

[Note: CNR: carrier to noise ratio, QPSK: Quadrature phase shift keying, QAM: Quadrature amplitude modulation]

[8 marks]

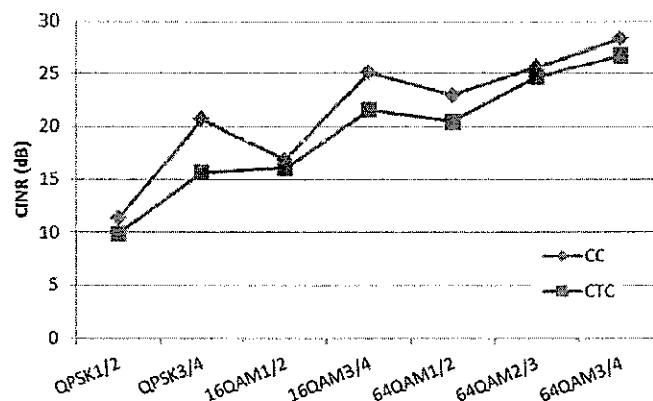


Figure Q4

- (d) Distinguish between the two standard of wireless 5G which are Wimax and Wibro.

[4 marks]

**End of Paper**